

# GREAT DESIGNS IN **STEEL**

## **INNOVATIVE STEEL BATTERY HOUSING**

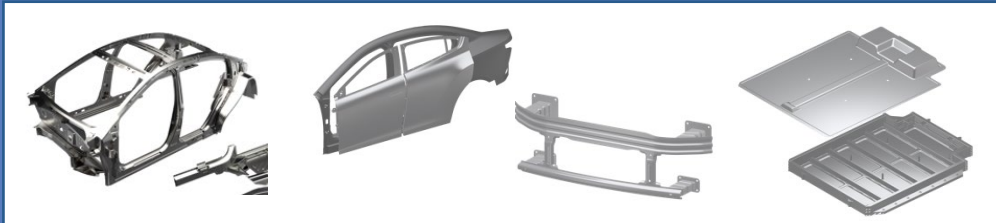
Sérgio Faria Rodriguez

Gestamp – Energy Unit Manager

# GESTAMP PORTFOLIO



## Body in White



## Chassis



## Mechanisms



Gestamp is a Global and Technological Supplier

Gestamp is a Spanish multinational company specialized in the design, development and manufacture of components for the leading automobile manufacturers



### Broad Product Portfolio

- ▶ Body-in-White, Chassis and Mechanisms
- ▶ Focus in Safety increase and Weight reduction



### Innovative Products & Technologies

1  
3  
R&D Centers

1.50  
0  
Professionals focused on R&D



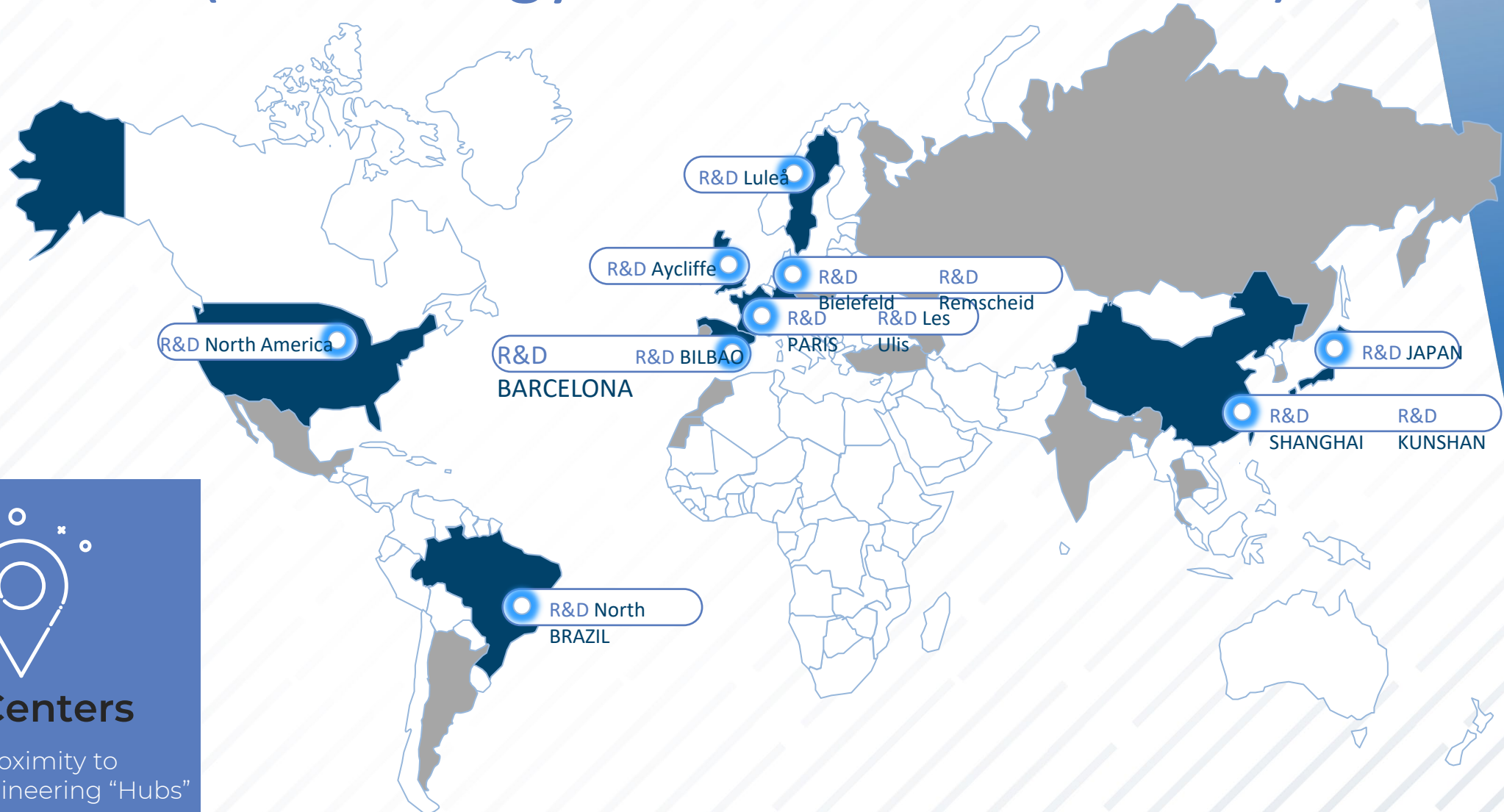
### Global Footprint

DOORS  
CHECKS

2  
4  
Countries

More than  
100  
industrial plants worldwide

# Global Footprint/R&D Centers (Technology and innovation office)

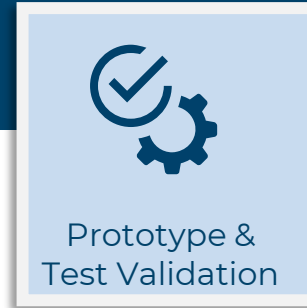
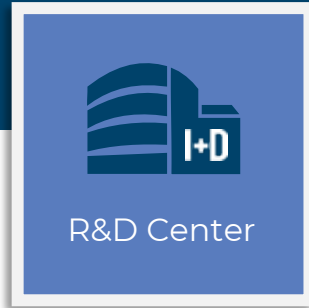


**13**  
**R&D Centers**

In Close Proximity to  
OEMs' Engineering "Hubs"

# GESTAMP BATTERY BOX CAPACITIES AND EXPERIENCE

Complete Structure For Battery Box Programs

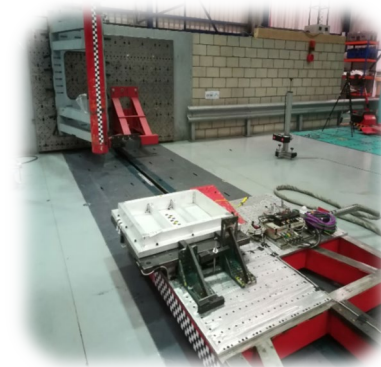
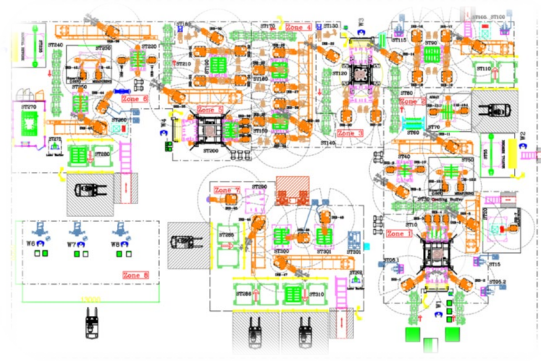
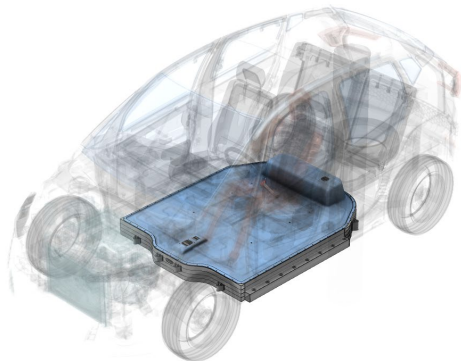


Full Capability in Battery Box Development

Strong Process Assembly Knowledge

Internal Battery Box Prototype and Test Capabilities

22 Battery Box Programs Worldwide



# Future Mobility

## Electric Vehicles

LONG DISTANCE CAR

ROAD  
ENVIROMENT



### GESTAMP Technologies

- Big battery box size
- Higher vehicle range
- Family Car – Private use
- Road Transport



SMALL CITY CAR

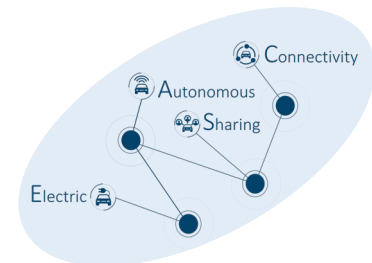
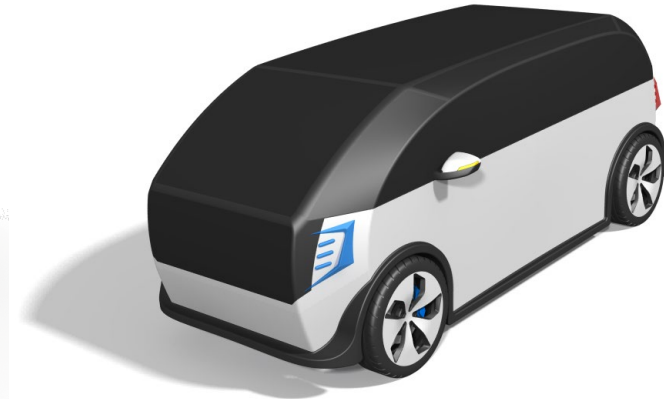
URBAN  
ENVIROMENT



### Different technologies required

- Small battery box size
- Cost Driven solution
- Highly influenced by CASE
- Company Cars – Sharing or City Transport

LAST MILE DELIVERY



Gestamp R&D center supports to find the best solution to the new mobility

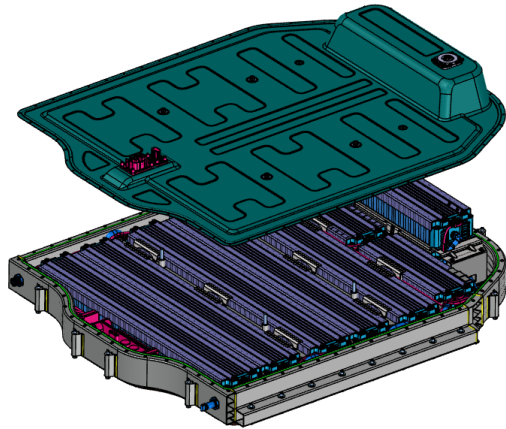
# Battery Box Innovation

## Battery Box Concept Evolution

Former Design

1st Concept Evolution

2nd Concept Evolution

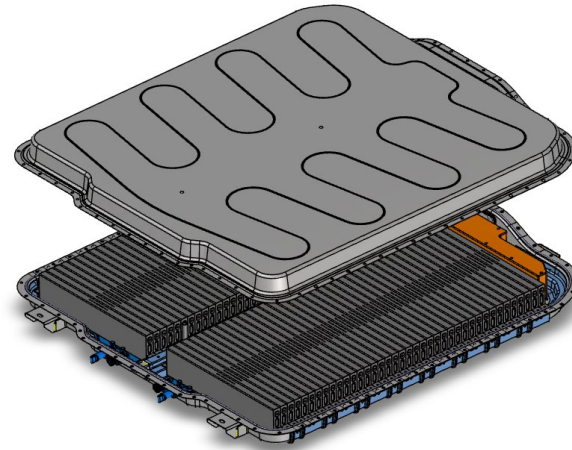


### Cell To Module

 Cells gathered in modules

 Many single parts

 Complex Assembly

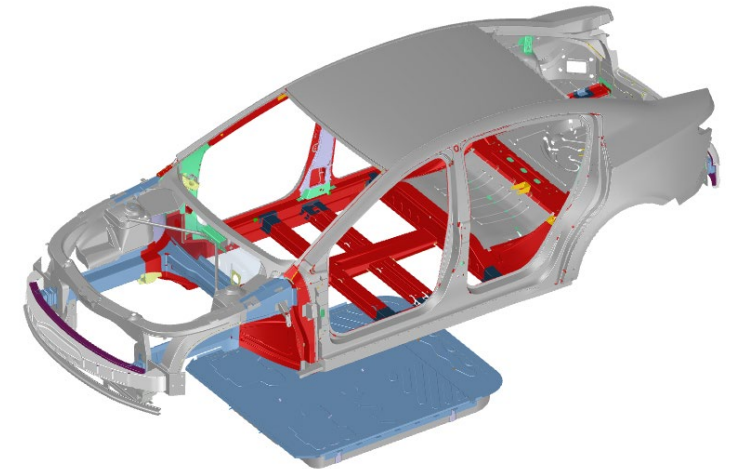


### Cell To Pack


 Energy storage increase by 15%

 Few and easier forming parts

 Easy Assembly



### Cell To Body

 Complete integration into the vehicle's BiW.  
No added parts

 Safety and tightness ensured by BiW

# Battery Box Innovation

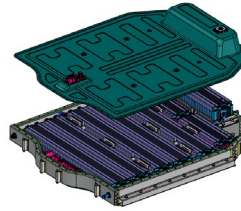
## CELL TO PACK

### CONCEPT DESCRIPTION

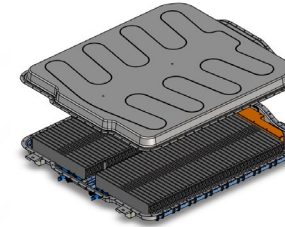
POTENTIAL

- Complete tight solution
- Less components = cost saving
- Increased packing efficiency

Cell to Module



Cell to Pack



### ADVANTAGES OF GESTAMP CELL TO PACK CONCEPT

01

**One single Stamping Cradle**

Leak proof

02

**No Cross-members**

Maximum Energy Storage

03

**Standard Welding Process**

Design to Cost

04

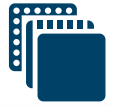
**Intensive adhesive usage**

Reduce welding distortion



# Battery Box Innovation

CELL TO PACK – Product Definition

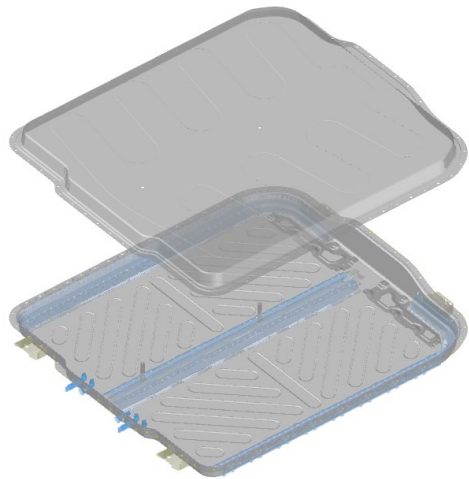


## Material SELECTION

Different Steel grades were chosen for specific requirements.  
The right material in the right place

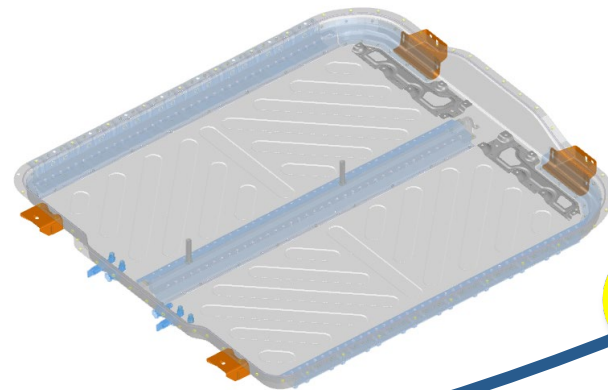
1

**Mild Steel**  
High Formability  
Upper Cover, Battery Housing



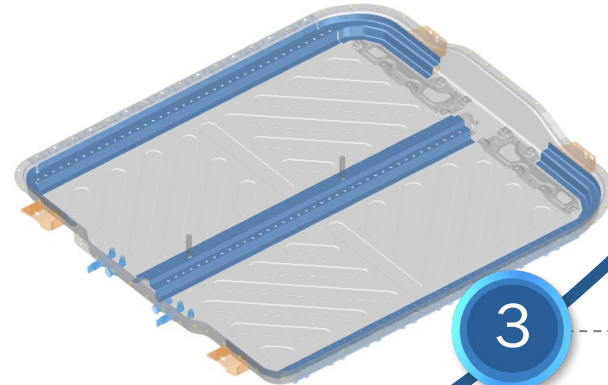
2

**High Strength Low Alloy Steel**  
Higher Mechanical Properties  
Front and Rear BiW Fix Brackets



3

**Dual Phase Steel**  
Crash Resistance  
Lateral and Mid Longitudinal Members



1

2

3

Mechanical Properties (UTS)



# Battery Box Innovation

CELL TO PACK – Full Vehicle Crash Simulation



## Side Pole Test

Most significant to check the performance of the battery housings.  
Cell integrity must be checked after this crash event



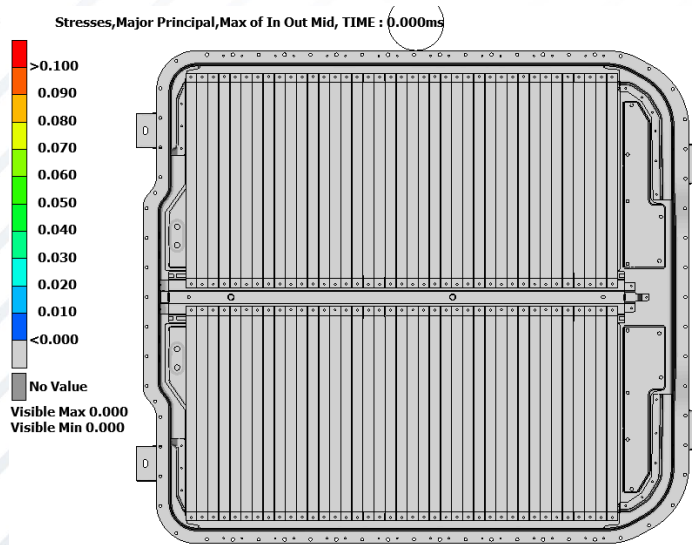
# Battery Box Innovation

## CELL TO PACK – Component Validation

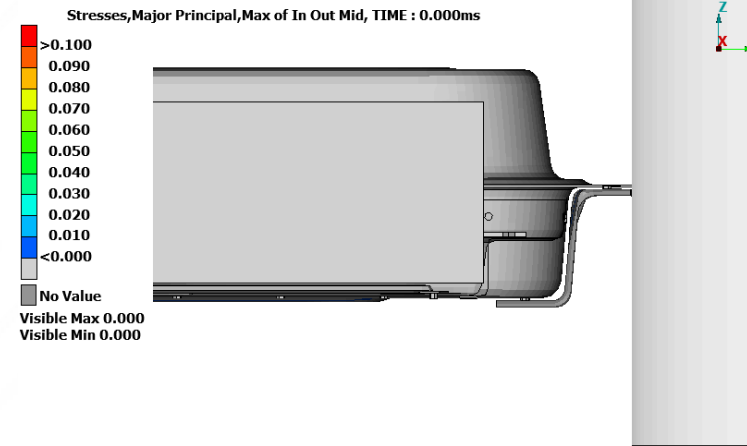


### Lateral crush - cae simulation

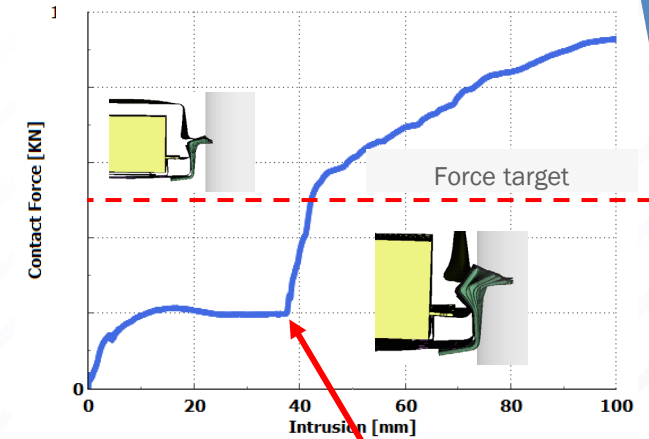
Top View



Lateral View



Graphic Force x Intrusion



1<sup>st</sup> Contact with Battery Flange:  
35mm

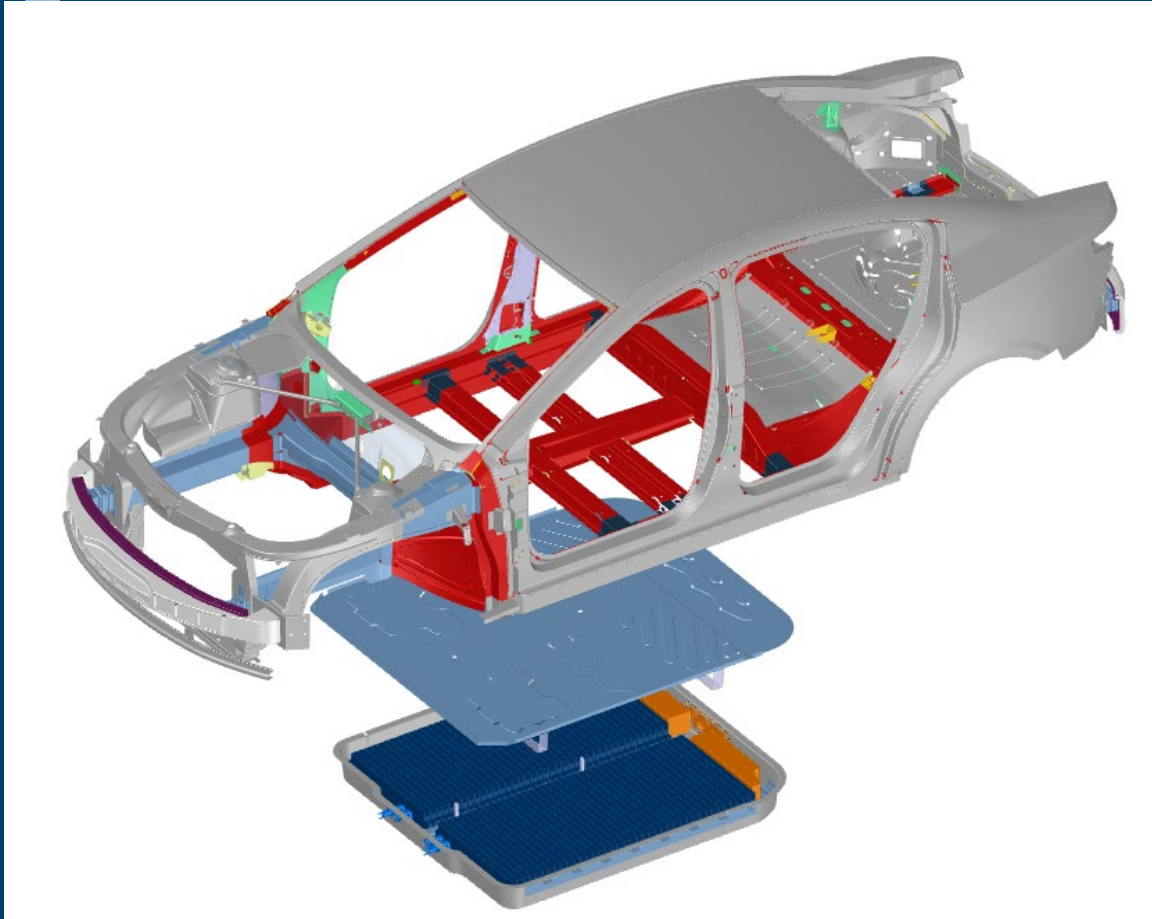


### Virtual Validation

- Mechanical Shock – Acceleration in X, Y and Z direction
- Modal and Vibration Analysis
- Bollard Test – Crash Analysis for underbody protection
- Other Load cases

# Battery Box Innovation

## GESTAMP Cell to Body



### Parts Integration

Vehicle floor and battery box upper cover in the same part.



### Crash Performance

Safety and crash performance ensured by BiW



### Cost Reduction

Reduction of one big stamping part, less tooling less assembly process

# Battery Box AND BIW Innovations

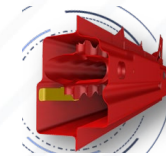
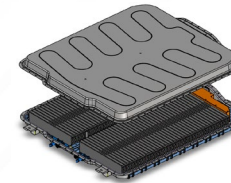
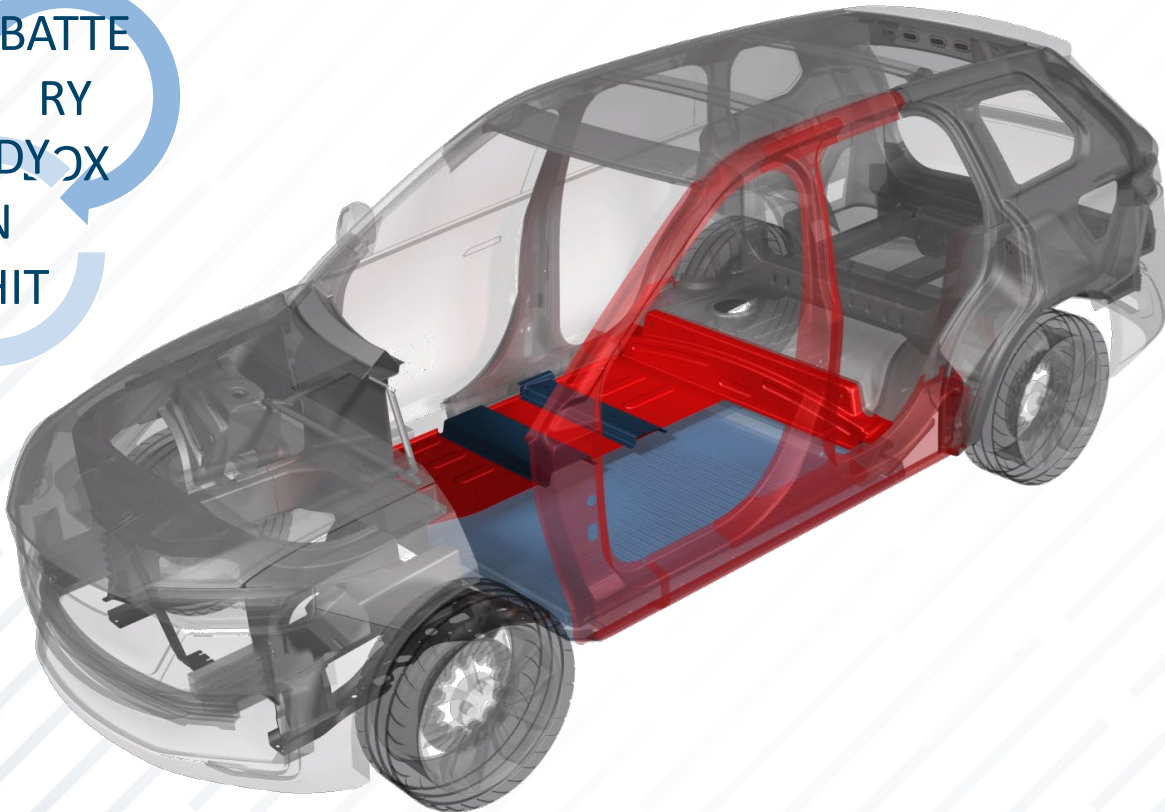
## Battery Box Future Developments



### Multi disciplinary team work

Strong collaboration between battery box and body in white team working in a complete system solution

BATTE  
RY  
BODY  
BOX  
IN  
WHIT  
E



Cell To Pack  
Cell to Body

Door Ring

Wave Rocker

One Piece PH  
Floor

# ELECTRIC VEHICLES

New Concepts, Innovative Designs and Improved Concepts



complete ev system solution

The future concept of battery boxes need a new interpretation of the body in white. Therefore Gestamp is developing new solutions for future Electric Vehicles.



*Single part solution*



*Assembly concepts*



*Full vehicle EV Solution*



Energy Storage  
Family Products  
GES-ENUBOX™

Extreme size parts  
Ges-GIGASTAMPING™

# TAKE AWAYS

## Key Points

01

✓ *Cell to Pack or Cell to Body are the mainstream battery box concepts for next years*

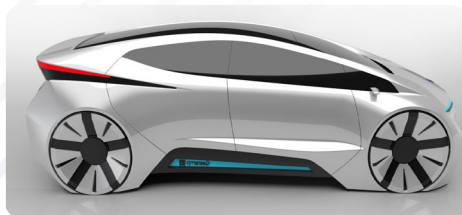
02

✓ *Gestamp is focused in complete systems as the best solutions to fulfill new EV requirements*

03

✓ *Cost competitive solutions to meet crash, weight and CO<sub>2</sub> footprint needs to meet current and future regulations.*

**Gestamp**   
E-Mobility



*Your Best Partner for EV Solutions*



# FOR MORE INFORMATION

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